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PETITION FEE
Under 37 CFR 1.17(f), (g) & (h)

TRANSMITTAL

(Fees are subject to annual revision)

Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Application Number	10/816,913
Filing Date	April 5, 2004
First Named Inventor	H. Morimoto
Art Unit	
Examiner Name	
Attorney Docket Number	500.43732X00

Enclosed is a petition filed under 37 CFR §1.102(d) that requires a processing fee (37 CFR 1.17(f), (g), or (h)). Payment of \$ 130.00 is enclosed.

This form should be included with the above-mentioned petition and faxed or mailed to the Office using the appropriate Mail Stop (e.g., Mail Stop Petition), if applicable. For transmittal of processing fees under 37 CFR 1.17(i), see form PTO/SB/171.

Payment of Fees (small entity amounts are NOT available for the petition (fees))

☒ The Commissioner is hereby authorized to charge the following fees to Deposit Account No. 50-1417:
☐ petition fee under 37 CFR 1.17(f), (g) or (h) ☒ any deficiency of fees and credit of any overpayments
Enclose a duplicative copy of this form for fee processing.

☐ Check in the amount of \$ _____ is enclosed.

☒ Payment by credit card (From PTO-2038 or equivalent enclosed). Do not provide credit card information on this form.

Petition Fees under 37 CFR 1.17(f): Fee \$400 Fee Code 1462

For petitions filed under:

- § 1.53(e) - to accord a filing date.
- § 1.57(a) - to according a filing date.
- § 1.182 - for decision on a question not specifically provided for.
- § 1.183 - to suspend the rules.
- § 1.378(e) for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.
- § 1.741(b) - to accord a filing date to an application under §1.740 for extension of a patent term.

Petition Fees under 37 CFR 1.17(g): Fee \$200 Fee code 1463

For petitions filed under:

- §1.12 - for access to an assignment record.
- §1.14 - for access to an application.
- §1.47 - for filing by other than all the inventors or a person not the inventor.
- §1.59 - for expungement of information.
- §1.103(a) - to suspend action in an application.
- §1.136(b) - for review of a request for extension of time when the provisions of section 1.136(a) are not available.
- §1.295 - for review of refusal to publish a statutory invention registration.
- §1.296 - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.
- §1.377 - for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.
- §1.550(c) - for patent owner requests for extension of time in ex parte reexamination proceedings.
- §1.956 - for patent owner requests for extension of time in inter partes reexamination proceedings.
- § 5.12 - for expedited handling of a foreign filing license.
- § 5.15 - for changing the scope of a license.
- § 5.25 - for retroactive license.

Petition Fees under 37 CFR 1.17(h): Fee \$130 Fee Code 1464

For petitions filed under:

- §1.19(g) - to request documents in a form other than that provided in this part.
- §1.84 - for accepting color drawings or photographs.
- §1.91 - for entry of a model or exhibit.
- §1.102(d) - to make an application special.
- §1.138(c) - to expressly abandon an application to avoid publication.
- §1.313 - to withdraw an application from issue.
- §1.314 - to defer issuance of a patent.

Name (Print/Type)	Colin D. Barnitz	Registration No. (Attorney/Agent)	35,061
Signature		Date	August 1, 2005

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/816,913 Confirmation No. 2655
Applicant : MORIMOTO, H.
Filed : April 5, 2004
Titled : STORAGE UNIT, STORAGE UNIT CONTROL METHOD,
AND STORAGE SYSTEM
TC/AU : 2186
Examiner : TBD
Docket No. : 500.43732X00
Customer No.: 24956

PETITION TO MAKE SPECIAL
(ACCELERATED EXAMINATION UNDER MPEP § 708.02(VIII))

MAIL STOP PETITIONS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Applicants petition the Commissioner to make the above-identified application special in accordance with 37 CFR §1.102(d). In support of this Petition, pursuant to MPEP § 708.02(VIII), Applicants state the following.

(A) REQUIRED FEE

This Petition is accompanied by the fee set forth in 37 CFR § 1.117(h).

Payment of the fee has been made in the manner set forth below in Section (G).

(B) ALL CLAIMS ARE DIRECTED TO A SINGLE INVENTION

All the claims of the application, claims 1-15, are directed to a single invention. If the Office determines that all claims in the application are not directed to a single invention, Applicant will make election without traverse as a prerequisite to the grant of special status in conformity with established telephone restriction practice.

As set forth in independent claims 1, 6 and 11, the invention is generally directed to a control method of controlling an information processing apparatus and a storage device. Under independent claim 1, the invention is, a storage unit connected communicably to a plurality of other storage units each having a plurality of first hard disk drives on which data is stored, said storage unit comprising: a plurality of second hard disk drives on which data is stored; a first receiving unit that receives copies of first storage data and first identifiers from said other storage units, said first storage data being stored in a plurality of storage blocks created by logically partitioning a data storage area of said plurality of first hard disk drives, said first identifiers identifying the storage blocks; a first operation controller that calculates an exclusive OR of the copies of the first storage data, with a correspondence established among the first identifiers, from the copies of the first storage data received by said first receiving unit from said other storage units; and a first storage controller that stores a calculation result of the exclusive OR, calculated by said first operation controller, into storage blocks of said second hard disk drives, said storage blocks of said second hard disk drives having second identifiers corresponding to the

first identifiers, said second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of said plurality of second hard disk drives.

Additionally, under independent claim 6, the invention is a method of controlling a storage unit connected communicably to a plurality of other storage units each having a plurality of first hard disk drives on which data is stored and having a plurality of second hard disk drives on which data is stored, said method comprising the steps of: receiving copies of first storage data and first identifiers from said other storage units, said first storage data being stored in a plurality of storage blocks created by logically partitioning a data storage area of said plurality of first hard disk drives, said first identifiers identifying the storage blocks; calculating an exclusive OR of the copies of the first storage data, with a correspondence established among the first identifiers, from the copies of the first storage data received from said other storage units; and storing a calculation result of the exclusive OR into storage blocks of said second hard disk drives, said storage blocks of said second hard disk drives having second identifiers corresponding to the first identifiers, said second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of said plurality of second hard disk drives.

Further, under independent claim 11, the invention is a storage system comprising a plurality of first storage units each having a plurality of first hard disk drives on which data is stored; and a second storage unit connected communicably

to the first storage units and having a plurality of second hard disk drives on which data is stored, wherein said first storage unit comprises: a first data sending unit that sends a copy of first storage data and first identifiers to said second storage unit, said first storage data being stored in a plurality of storage blocks created by logically partitioning a data storage area of said plurality of first hard disk drives, said first identifiers identifying the storage blocks, said second storage unit comprises: a first data receiving unit that receives copies of the first storage data and the first identifiers from said first storage units; a first data operation controller that calculates an exclusive OR of the copies of the first storage data, with a correspondence established among the first identifiers, from the copies of the first storage data received by said first receiving unit from said first storage units; and a first data storage controller that stores a calculation result of the exclusive OR, calculated by said first data operation controller, into storage blocks of said second hard disk drives, said storage blocks of said second hard disk drives having second identifiers corresponding to the first identifiers, said second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of said plurality of second hard disk drives.

(C) PRE-EXAMINATION SEARCH

A pre-examination search has been conducted, directed to the invention as claimed. The pre-examination search was conducted in the following US Manual of Classification areas:

<u>Class</u>	<u>Subclass</u>
710	65, 74
711	100, 111-114, 122, 163, 165, 170, 203
714	5-6, 718, 746

Furthermore, a keyword search was conducted on the USPTO's EAST database, including the US patent database, the published patent applications database, and the European and Japanese patent abstract databases. In addition, a search for non-patent literature was conducted on the ACM (Association for Computing Machinery) online databases.

(D) REFERENCES DEEMED MOST-CLOSELY RELATED TO THE SUBJECT MATTER ENCOMPASSED BY THE CLAIMS

Based upon a review of the documents located by the search and the documents already of record in the application, the references deemed to be most-closely related to the subject matter encompassed by the claims are listed below. These documents were made of record in the present application by the Information Disclosure Statement filed on July 20, 2005.

<u>Document No.</u>	<u>Inventor</u>
US 6530035	Bridge
US 20020059539	Anderson, D. B.
US 20030200478	Anderson, M. H.
US 20030221061	El-Batal et al.
US 20040123063	Dalal et al.
US 20050086567	Cronch

Because all of the above-listed references are already of record in the present application, in accordance with MPEP § 708.02(VIII)(D), additional copies of these documents have not been submitted with this Petition.

(E) DETAILED DISCUSSION OF THE REFERENCES

Following a brief discussion of the invention, the references deemed most-closely related are discussed below in Section (E)2, pointing out, with the particularity required by 37 CFR 1.111 (b) and (c), how the claimed subject matter is patentable over the teachings of these documents.

1. Discussion of the Invention

The present invention provides for a system and method to restore data stored in a storage area of any one of plural storage units connected to a parity storage unit. For example, to restore the data stored in the storage area of a first storage unit, the data stored in the parity storage unit is exclusive ORed with the data stored in the plural storage units other than the first storage unit to restore the data stored in the first storage unit. In this way, data stored in the storage areas of the plural storage units can be backed up no matter how many storage units are connected communicably to the parity storage unit. It is submitted that the cited references, whether taken individually, or in combination, fail to teach or suggest the invention as claimed in independent claims 1, 6 and 11.

As set forth in claims 1, 6 and 11, a first feature of the invention includes, calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of the second hard disk drives.

As will be discussed in more detail below, the prior art does not teach or suggest, at a minimum, the above-described feature.

2. Discussion of the References Deemed to be Most-Closely Related

The patent to Bridge, US 6530035, discloses a protection against a loss of information in an event of disk drive failure in a computer system. The computer system has a first disk drive 510 and a second disk drive 514 for mirroring copies. One mirrored copy is stored as an extent 508 on the first disk 510 and the other mirrored copy is stored as an extent 512 on the second disk drive 514. Alternatively to mirroring, a parity protection is utilized by keeping a parity extent for every few data extends. The parity extent contains an exclusive OR of all the corresponding data extents. If one of the extents within a parity set is lost due to a disk drive failure, then the contents can be recalculated from other extents in its parity set. (See, e.g., Abstract; column 11, lines 57-67; column 12, lines 1-45; and Figures 1 and 4-16.) Thus, while Bridge teaches maintaining a parity extent that contains an exclusive OR

of all corresponding data extents, Bridge does not teach using identifiers for identifying storage blocks. More particularly, Bridge does not teach calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of the second hard disk drives, as recited in claims 1, 6 and 11.

The published patent application to D. Anderson, US 20020059539, discloses a parity protection against disk drive failure in a computer system. The computer system has a drive 402 as a target drive and drive 404 as a parity drive. The target drive 402 connects to the parity drive 404 via an interconnect 122, such as Fibre Channel interface or serial interface. Each target drive 402 and parity drive 404 includes control component 150 and one or more discs 132. Each drive includes an Exclusive OR (XOR) circuit 408. The XOR commands enable disc drives to carry out the bit manipulations for parity protection against drive failure. (See, e.g., Abstract; paragraphs 142-166; and Figures 26-29.) However, unlike the present invention, Anderson does not disclose second identifiers corresponding to first identifiers, where the identifiers identify storage blocks. More particularly, Anderson does not teach calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard

disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of the second hard disk drives, as recited in claims 1, 6 and 11.

The published patent application to M. Anderson, US 20030200478, discloses in the description of prior art a RAID controller system having an XOR function of a parity engine chip 108 for detecting a failed disk drive. The RAID controller system has a plurality of disk drives 102. The plurality of disk drives 102 forms a RAID disk drive array. The parity engine chip 108 includes logic for calculating check bytes via exclusive OR (XOR) functions. The check bytes are used in recreating data in a particular position of a failed disk drive in conjunction with a data stripe stored in the same position of other non-failed disk drives. (See e.g., Abstract; paragraphs 7-9; and Figures 1-2.) Thus, while Anderson discloses recreating data using an XOR function, Anderson does not disclose using second identifiers corresponding to first identifiers, where the identifiers identify storage blocks. More particularly, Anderson does not teach calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks

created by logically partitioning a data storage area of the second hard disk drives, as recited in claims 1, 6 and 11.

The published patent application to El-Batal et al., US 20030221061, discloses a system for interfacing between a first controller 801 and a second controller 821 to a storage array system 850 by a serial connection. The first controller 801 and the second controller 821 control the storage devices 845 of the storage array system 850. Each of first controller 801 and the second controller 821 includes a first exclusive OR circuit 808 and a second exclusive OR circuit 828. The XOR circuits 808 and 821 are for error checking. (See e.g., Abstract; paragraphs 45 and 59; and Figures 2, 5 and 7-8.) However, unlike the present invention, El-Batal et al. do not disclose identifiers identifying storage blocks. More particularly, Bridge does not teach calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of the second hard disk drives, as recited in claims 1, 6 and 11.

The published patent application to Dalal et al., US 20040123063, discloses a RAID-3 storage system having two subdisks 260A-1 and 260A-2. An embedded

error checking information is used to detect errors in the RAID-3 storage system. Then, a data recovery for the RAID-3 storage system is accomplished by calculation of exclusive OR (XOR) of information recorded on the other subdisks. (See e.g., Abstract; paragraphs 20-24, 32, 226 and 230; and Figures 1-7.) Thus, while Dalal et al. teach data recovery using an exclusive OR calculation, Dalal et al. do not disclose using second identifiers corresponding to first identifiers, where the identifiers identify storage blocks. More particularly, Dalal et al. do not teach calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of the second hard disk drives, as recited in claims 1, 6 and 11.

The published patent application to Cronch, US 20050086567, discloses a data storage system 100 including a plurality of storage devices 110-112. The storage device 110 includes discs (RAID) subsystems connected to requesters 116, 118, and 120 (servers, clients...etc...). The requesters 116, 118, and 120 directly access the information on the storage device 110. When the storage device 110 has an error, an exclusive OR circuit 820 and an exclusive OR circuit 826 are used for error data recovery. A user data is first provided to the exclusive OR circuit 820 (via an encoder 816) from the requester (116, 118, and 120). A control component 150

identifies and corrects errors in the user data. (See e.g., Abstract; paragraphs 15, 29-31 and 52-54; and Figures 1 and 8.) However, unlike the present invention, Cronch fails to disclose identifiers identifying storage blocks. More particularly, Cronch does not teach calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of the second hard disk drives, as recited in claims 1, 6 and 11.

(F) CONCLUSION

As demonstrated by the above discussion, the references fail to teach or suggest, at a minimum, calculating an exclusive OR of copies of a first storage data, and storing a calculation result of the exclusive OR into storage blocks of second hard disk drives, the storage blocks of the second hard disk drives having second identifiers corresponding to first identifiers identifying storage blocks of first hard disk drives, the second identifiers individually identifying a plurality of storage blocks created by logically partitioning a data storage area of the second hard disk drives, as recited in claims 1, 6 and 11.

Thus, it is submitted that all of these claims are patentable over the cited references taken individually, or in combination with each other. The remaining

claims are dependent claims, claim additional features of the invention, and are patentable at least because they depend from allowable base claims. Accordingly, the requirements of 37 CFR §1.102(d) having been satisfied, the Applicants request that this Petition to Make Special be granted and that the application be examined according to prescribed procedures set forth in MPEP §708.02 (VIII).

The Applicants prepared this Petition in order to satisfy the requirements of 37 C.F.R. §1.102(d) and MPEP §708.02 (VIII). The pre-examination search required by these sections was “directed to the invention as claimed in the application for which special status is requested.” MPEP §708.02 (VIII). The search performed in support of this Petition is believed to be in full compliance with the requirements of MPEP §708.02 (VIII); however, Applicants make no representation that the search covered every conceivable search area containing relevant prior art. It is always possible that prior art of greater relevance to the claims may exist. The Applicants urge the Examiner to conduct his or her own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited above and any other prior art that may be located by the Examiner’s independent search.

Further, while the Applicants have identified and discussed certain portions of each cited reference in order to satisfy the requirement for a “detailed discussion of the references, which discussion points out, with the particularity required by 37 C.F.R. §1.111(b) and (c), how the claimed subject matter is patentable over the references” (MPEP §708.02(VIII)), the Examiner should not limit review of these

documents to the identified portions, but rather is urged to review and consider the entirety of each reference.

(G) FEE PAYMENT (37 C.F.R. 1.17(h))

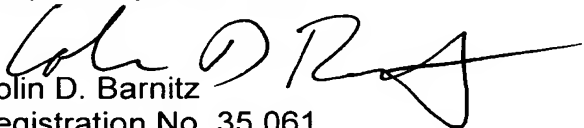
The fee required by 37 C.F.R. § 1.17(h) is to be paid by:

☒ the Credit Card Payment Form (attached) for \$130.00.

☐ charging Account 50-1417 the sum of \$130.00.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417. A duplicate of this petition is attached.

Respectfully submitted,


Colin D. Barnitz
Registration No. 35,061

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Date: August 1, 2005